

# PATENT SPECIFICATION (11)

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## (54) BUNG DRUM MADE OF PLASTICS WITH ONE OR MORE BUNG OPENINGS

(71) We, GPG HOLDINGS LIMITED of Cranford, Blackdown, Leamington Spa, Warwickshire, and THERMO PLASTICS LIMITED of Luton Road, Dunstable, Bedfordshire, both British Companies, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to a container drum assembly and to a method of manufacturing such an assembly.

According to the present invention there is provided a container drum assembly comprising a thermoplastics blow moulded drum body part having a wall forming a mouth and a plastics closure member incorporating a bung opening and which is secured to the wall to close the mouth; in which the wall of the drum body part adjacent to the mouth is of substantially corrugated formation to provide an inwardly directed internal peripheral protuberance spaced from the peripheral edge of the wall at the mouth; the closure member has an endless peripheral external flange portion and a peripheral skirt portion which portions are received within the mouth of the drum body part, said skirt and flange portions together forming an endless external peripheral recess on the closure member; the closure member engaging with the drum part by location of the internal peripheral protuberance of the drum wall in the external peripheral recess of the closure member, and wherein the closure member is secured by welding to the drum body part to provide a seal over the joint between the closure member and the drum body part.

Further according to the present invention there is provided a method of manufacturing a container drum assembly as specified in the immediately preceding paragraph which comprises forming the drum body part by blow moulding, locating the closure member to close

the mouth formed by the drum body part wall and securing the closure member to the drum body part wall by welding to provide a seal over the joint between the closure member and the drum body part.

If required the closure member may interlock with the drum wall by the arrangement disclosed in our co-pending Application No. 23067/73 (Serial No. 1430983) by which the corrugated portion of the wall of the drum body part adjacent to the mouth is provided with a peripheral lip directed inwardly of the mouth and the closure member is provided with an endless external peripheral groove within which is received and the inwardly directed lip of the drum wall. If required the, or another, peripheral groove of the closure member may contain a gasket or sealing ring which is retained therein by pressure from part of the corrugated portion of the drum wall which engages with the gasket to effect a seal.

Generally the drum body part will be moulded in a plastics material having a high molecular density such as polyethylene.

By defining the mouth by a corrugated wall portion as aforementioned it will be apparent that there will be formed on the outer side of the corrugated portion an external peripheral groove which coincides with the internal peripheral protuberance and this external peripheral groove may provide an adequate recess by which the drum assembly can be gripped for the purpose of handling. A preferred and convenient form for the corrugated portion is that of substantially "S" shape in section through the wall thickness of that portion whereby the upper tail end of the S-shape corresponds to the aforementioned inwardly directed peripheral lip.

Preferably the closure member is produced in the plastics material by injection moulding so that the bung hole or bung holes are integrally formed therewith.

During the manufacture of the container drum assembly of the present invention it is

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preferred that the closure member is fitted within one mouth of the drum part while the portion of the drum wall defining the mouth is above ambient temperature. The drum body part at its mouth portion may then shrink to effect a firm engagement with the closure member.

The securing of the closure member to the drum body part by welding is conveniently achieved by a spin welding technique or by hot wire or ribbon welding so that a welded seal is provided whereby a layer of plastics extends along the periphery of the closure member joining it to the corrugated wall portion which defines the mouth. It will be realised that, as the welding between the closure member and drum body part provides an effective seal between these parts, the sealing ring or gasket as aforementioned may be omitted.

The manufacture of the container drum assembly by use of the shrinkage technique discussed above is convenient since it effectively utilises the fact that blow moulded hollow bodies of thermoplastics material have, after their blow moulding, a considerable linear delayed shrinkage the extent of which can be determined to a reasonable degree of accuracy by knowledge and control of the ejection temperature and of the wall thickness (the latter of which may amount to approximately 3% of the diameter of the drum in the case of drums having circular cross section). It has been found that for a container drum assembly of the present invention having a circular mouth of approximately 500 mm. diameter opening, an engagement between the mouth portion of the drum body part wall and the closure member of approximately 7 to 8 mm. extent is adequate for achieving a reasonably safe joint between the two parts.

One embodiment of a container drum assembly constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying illustrative drawing which shows part of the assembly in section.

The container drum assembly comprises a thermo plastics drum body part 1 which is blow moulded as an integral unit to be of substantially circular section and have a closed base (not shown) and a mouth formed by a corrugated portion 2 of the drum body part side wall. The mouth of the drum body part is closed by a closure member 6 which is partly received therein. The member 6 is injection moulded in plastics material and incorporates a bung hole 16.

The corrugated portion 2 which is formed during the blow moulding of the drum body part is of substantially "S"-shape in section through the wall thickness of the drum part so that the upper tail end of the "S"-shape provides a peripheral lip 4 which is directed radially inwardly of the mouth while a lower portion of the "S"-shape provides an inwardly

internal convex peripheral protuberance 3. Formed between the internal protuberance 3 and lip 4 is an endless inner peripheral groove 5.

The closure member 6 has an endless external flange portion which comprises two circumferentially spaced and parallel ribs 11 and 12 extending radially outwardly relative to the cap and which are braced together by an array of bridging portions 15 which portions are circumferentially spaced around the closure member 6. Incorporated in the member 6 and extending downwardly thereof is a peripheral skirt 7 having an outwardly directed foot portion 10. This skirt, with its foot portion 10 defines, together with the rib 11, a first external circumferential recess 8 on the closure member. A second external circumferential recess 9 is provided on the member 6 between the rib 12 and an uppermost flange 13 which provides a flat top to the closure member.

With the closure member 6 assembled in the drum body part 1 the peripheral flange portion formed by the ribs 11 and 12 of the member 6 are closely received in the inner groove 5 of the drum wall while the peripheral protuberance 3 of the drum wall is simultaneously closely received in the circumferential recess 8 of the closure member. In addition the second recess 9 of the closure member closely receives the inwardly directed lip 4 of the drum wall. To achieve such assembly the appropriate portion of the closure member 6 is preferably inserted into the mouth of the drum body part 1 while the plastics material forming the mouth is at a temperature above ambient. By assembling the drum in this manner it will be appreciated that as the corrugated portion of the drum body part cools it will contract radially and thereby urge the lip 4 and protuberance 3 into close engagement with their respectively associated recesses on the closure member while the flange portion presented by the ribs 11 and 12 is urged into engagement with the recess 5 in the drum wall as a result of the radially inwardly directed compression forces which are applied to the closure member from the drum wall. The reaction on the ribs 11 and 12 is in a sense to urge these towards each other and the bridging portions 15 are provided to alleviate such movement. Consequently the closure member will be firmly secured against outward movement relative to the drum part by virtue of its rib 12 being anchored beneath the lip 4 and the foot portion 10 of the skirt being anchored beneath the circumferential protuberance 3 of the drum wall.

It will be noted that the bung hole 16 is moulded into the closure member 6 in a recess to lie below the flange 13 thereby permitting the flange 13 to present a substantially flat face to facilitate stacking. Conveniently the peripheral side wall for the recess of the closure member 6 within which the bung hole 16 is located and also the external face of the drum wall over its portion forming the groove 5 is

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provided with a peripherally spaced array of gripping ribs 17 to facilitate handling of the assembly. It will be particularly noticed from the drawing that the circumferential outer protuberance on the drum wall corresponding to the groove 5 and the underlying recess 18 corresponding to the internal circumferential protuberance 3 of the drum wall provide effective gripping positions for manual handling of the assembly and these gripping positions will generally have a relatively solid feel by virtue of the internal reinforcement presented by the co-operating parts of the closure member to the drum wall.

Following assembly of the closure member 6 with the drum body part 1 these two components are finally secured together by welding the flange 13 around its peripheral edge to the wall of the drum body part to provide a layer of plastics in the form of a seam 19 which forms a seal over the joint between the member 6 and the drum body part 1. The welding seam 19 may be formed, for example, by use of a hot wire technique or a spin welding process.

#### WHAT WE CLAIM IS:-

1. A container drum assembly comprising a thermoplastics blow moulded drum body having a wall forming a mouth and a plastics closure member incorporating a bung opening and which is secured to the wall to close the mouth; in which the wall of the drum body part adjacent to the mouth is of substantially corrugated formation to provide an inwardly directed internal peripheral protuberance spaced from the peripheral edge of the wall at the mouth; the closure member has an endless peripheral external flange portion and a peripheral skirt portion which portions are received within the mouth of the drum body part, said skirt and flange portions together forming an endless external peripheral recess on the closure member; the closure member engaging with the drum part by location of the internal peripheral protuberance of the drum wall in the external peripheral recess of the closure member, and wherein the closure member is secured by welding to the drum body part to provide a seal over the joint between the closure member and the drum body part.

2. A container drum assembly as claimed in claim 1 in which a peripheral lip directed inwardly of the mouth is provided on the wall of the drum body part at the peripheral edge thereof and the closure member has an endless external peripheral groove in which is received the inwardly directed lip of the drum wall.

3. A container drum assembly as claimed in claim 2 in which the closure member is secured by welding to the drum body part to provide the seal between the periphery of the closure member and part of the drum wall adjacent to the inwardly directed lip.

4. A container drum assembly as claimed in any one of the preceding claims in which the or a peripheral groove of the closure member contains a gasket or sealing ring which is retained therein by pressure from part of the corrugated portion of the drum wall which engages with the gasket to effect a seal therewith.

5. A container drum assembly as claimed in any one of the preceding claims in which the drum wall engages with the closure member to apply inwardly directed compression forces to the closure member.

6. A container drum assembly as claimed in claim 5 in which the drum wall is shrunk into engagement with the closure member.

7. A container drum assembly as claimed in any one of the preceding claims in which the seal over the joint between the closure member and the drum body part is formed by a spin welding process.

8. A container drum assembly substantially as herein described with reference to the accompanying illustrative drawing.

9. A method of manufacturing a container drum assembly as claimed in claim 1 which comprises forming the drum body part by blow moulding, locating the closure member to close the mouth formed by the drum body part wall and securing the closure member to the drum body part wall by welding to provide a seal over the joint between the closure member and the drum body part.

10. A method as claimed in Claim 9 which comprises locating the closure member at least partly within the mouth while the portion of the drum body part wall forming the mouth is above ambient temperature and shrinking that portion of the drum body part wall to effect a firm engagement between the closure member and drum body part.

11. A method as claimed in either claim 9 or claim 10 comprising forming the seal over the joint between the closure member and the drum body part wall by a spin welding process.

12. A method of manufacturing a container drum assembly as claimed in claim 9 and substantially as herein described.

13. A container drum assembly when produced by the method as claimed in any one of Claims 9 to 12.

provided with a peripherally spaced array of gripping ribs 17 to facilitate handling of the assembly. It will be particularly noticed from the drawing that the circumferential outer protuberance on the drum wall corresponding to the groove 5 and the underlying recess 18 corresponding to the internal circumferential protuberance 3 of the drum wall provide effective gripping positions for manual handling of the assembly and these gripping positions will generally have a relatively solid feel by virtue of the internal reinforcement presented by the co-operating parts of the closure member to the drum wall.

Following assembly of the closure member 6 with the drum body part 1 these two components are finally secured together by welding the flange 13 around its peripheral edge to the wall of the drum body part to provide a layer of plastics in the form of a seam 19 which forms a seal over the joint between the member 6 and the drum body part 1. The welding seam 19 may be formed, for example, by use of a hot wire technique or a spin welding process.

#### WHAT WE CLAIM IS:-

1. A container drum assembly comprising a thermoplastics blow moulded drum body having a wall forming a mouth and a plastics closure member incorporating a bung opening and which is secured to the wall to close the mouth; in which the wall of the drum body part adjacent to the mouth is of substantially corrugated formation to provide an inwardly directed internal peripheral protuberance spaced from the peripheral edge of the wall at the mouth; the closure member has an endless peripheral external flange portion and a peripheral skirt portion which portions are received within the mouth of the drum body part, said skirt and flange portions together forming an endless external peripheral recess on the closure member; the closure member engaging with the drum part by location of the internal peripheral protuberance of the drum wall in the external peripheral recess of the closure member, and wherein the closure member is secured by welding to the drum body part to provide a seal over the joint between the closure member and the drum body part.

2. A container drum assembly as claimed in claim 1 in which a peripheral lip directed inwardly of the mouth is provided on the wall of the drum body part at the peripheral edge thereof and the closure member has an endless external peripheral groove in which is received the inwardly directed lip of the drum wall.

3. A container drum assembly as claimed in claim 2 in which the closure member is secured by welding to the drum body part to provide the seal between the periphery of the closure member and part of the drum wall adjacent to the inwardly directed lip.

4. A container drum assembly as claimed in any one of the preceding claims in which the or a peripheral groove of the closure member contains a gasket or sealing ring which is retained therein by pressure from part of the corrugated portion of the drum wall which engages with the gasket to effect a seal therewith.

5. A container drum assembly as claimed in any one of the preceding claims in which the drum wall engages with the closure member to apply inwardly directed compression forces to the closure member.

6. A container drum assembly as claimed in claim 5 in which the drum wall is shrunk into engagement with the closure member.

7. A container drum assembly as claimed in any one of the preceding claims in which the seal over the joint between the closure member and the drum body part is formed by a spin welding process.

8. A container drum assembly substantially as herein described with reference to the accompanying illustrative drawing.

9. A method of manufacturing a container drum assembly as claimed in claim 1 which comprises forming the drum body part by blow moulding, locating the closure member to close the mouth formed by the drum body part wall and securing the closure member to the drum body part wall by welding to provide a seal over the joint between the closure member and the drum body part.

10. A method as claimed in Claim 9 which comprises locating the closure member at least partly within the mouth while the portion of the drum body part wall forming the mouth is above ambient temperature and shrinking that portion of the drum body part wall to effect a firm engagement between the closure member and drum body part.

11. A method as claimed in either claim 9 or claim 10 comprising forming the seal over the joint between the closure member and the drum body part wall by a spin welding process.

12. A method of manufacturing a container drum assembly as claimed in claim 9 and substantially as herein described.

13. A container drum assembly when produced by the method as claimed in any one of Claims 9 to 12.



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